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environmental assessment

rehabilitate grand loop road
biscuit basin to west thumb and the lake bypass

ORIGINAL
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YELLOWSTONE

NATIONAL PARK – WYOMING · MONTANA · IDAHO

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ENVIRONMENTAL ASSESSMENT

REHABILITATE GRAND LOOP ROAD

BISCUIT BASIN TO WEST THUMB AND THE LAKE BYPASS

YELLOWSTONE NATIONAL PARK

(Packages No. 254 & 673)

Prepared by:

U.S. Department of the Interior
National Park Service
Denver Service Center

February 1987

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U.S. Department of Interior
National Park Service
Environmental Assessment

Rehabilitate Grand Loop Road
Biscuit Basin to West Thumb and the Lake Bypass
Yellowstone National Park
Teton County, Wyoming

Summary:

The National Park proposes to rehabilitate several segments of Grand Loop Road and auxiliary features in Yellowstone National Park including the segment from the Biscuit Basin intersection to West Thumb, the West Thumb interchange and bypass, and the Lake Area bypass. Traffic is heavy on the road between Old Faithful and West Thumb, which is very narrow, congested, and in an advanced state of deterioration. The final application of asphalt was never applied to the three shorter bypass segments, leading to surface deterioration. This environmental assessment proposes and analyzes four alternatives. Under each of these alternatives, the existing road alignment would be utilized as much as possible. About 90 acres of disturbance would occur within the road corridor under the preferred 30-foot widening alternative. The affected environment is predominantly a lodgepole pine forest ecosystem, with some meadows, wetlands, and thermal features. Segments of this roadway are considered eligible for and are being nominated to the National Register of Historic Places. Some historic material and design features would be lost. Road improvements would provide a safer and more enjoyable driving experience for park visitors.

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TABLE OF CONTENTS

PURPOSE AND NEED..1

ALTERNATIVES CONSIDERED
Alternative A (Preferred): Rehabilitate And Widen Road to 30-Foot Top Width....5
Alternative B: No Action....17
Alternative C: Rehabilitate Existing Road....17
Alternative D: Rehabilitate And Widen Road to 34-Foot Top Width....18
Traffic Management Alternatives....19

AFFECTED ENVIRONMENT
Natural Environment....20
Cultural Environment....22
Socioeconomic/Visitor Use Environment....23

ENVIRONMENTAL CONSEQUENCES
Alternative A....25
Alternative B....29
Alternative C....31
Alternative D....32
Traffic Management Alternatives....34

CONSULTATION/COORDINATION/REFERENCES/PREPARERS....37

GRAPHICS
Project Location Map (Region)....3
Project Location Map - Biscuit Basin to West Thumb....7
Project Location Map - Lake Bypass....9
Kepler Cascades Turnout Concept Sketch....10
Scaup Lake Concept Sketch....11
Isa Lake Concept Sketch....12
Shoshone Point Concept Sketch....13
Worst Case Cut Slope Cross-section....14
Worst case Fill Slope Cross-section....15

PURPOSE AND NEED

The Grand Loop Road system provides the only means of motor vehicle access to the geologic and scenic wonders of Yellowstone National Park. The segment of road between Old Faithful and West Thumb over Craig Pass is the most heavily used portion of the loop, providing visitor access to the Old Faithful and Yellowstone Lake developed areas (see maps).

Seasonal average daily traffic (ADT) over the Old Faithful/West Thumb segment during 1985 was 6,900 vehicles, with peak days exceeding 8,000 vehicles. Eighty-nine percent of these vehicles were passenger cars or pickup trucks. Approximately 10% were recreational vehicles (RVs), and 1% were trucks and buses. Bicycle traffic is not recorded on this road segment. Projected 20-year design ADT is 8,500. Park Road Standards (NPS 1984) suggest a minimum of 11-foot lane widths with 4-foot paved shoulders for roads with this ADT. Roads with tour bus traffic or recreational vehicle traffic exceeding 5 per cent of the total are suggested to have 12-foot traffic lanes. Federal regulations have allowed wider vehicles since 1982, increasing the maximum vehicle width from 8 feet to 8 feet, 6 inches. Side mirrors are limited by most states to protruding another 6 inches beyond the vehicle, for a total width of 9 feet, 4 inches.

The existing road segment between Old Faithful and West Thumb was constructed in the 1930s, and the pavement structure is in very poor condition. The driving surfaces are severely rutted, cracked, and potholed. Drainage structures are inadequate and massive base failures have occurred in certain areas. Certain roadside backslopes are unstable, sloughing debris onto the roadway and resisting revegetation. Several culverts reduce or prevent fish spawning.

Existing road pavement widths between Old Faithful and West Thumb vary from 22 to 26 feet with minimal or no paved shoulders. The narrow width requires a high degree of driver concentration, while the narrow or nonexistent shoulders provide no recovery zone should a vehicle wander off the pavement edge. The pavement edge often has a sharp drop-off, creating a hazardous condition and promoting damage to the pavement edge. Most of the existing signs and guardrailings do not meet Federal Highway Administration (FHWA) or National Park Service (NPS) standards.

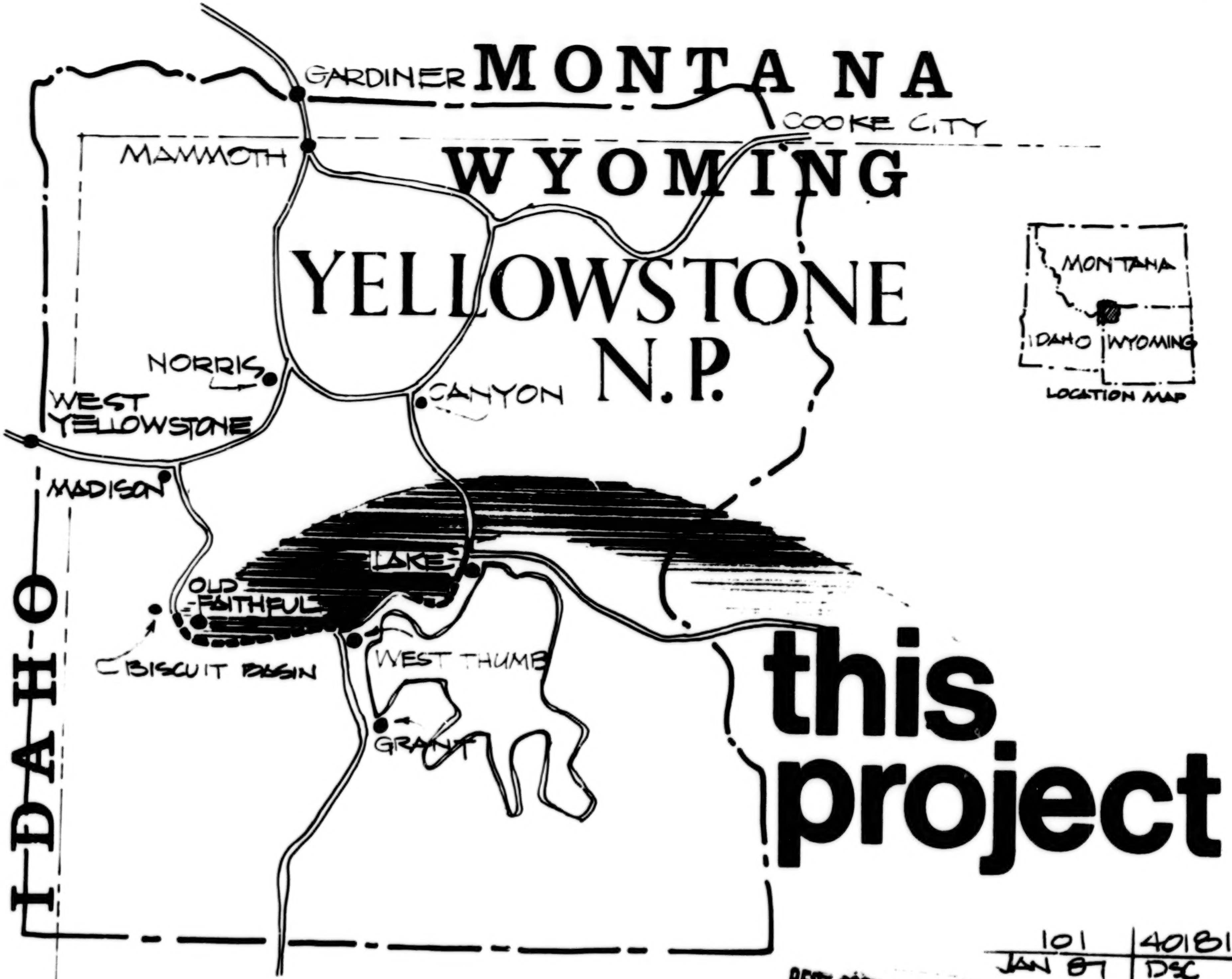
The Old Faithful/West Thumb segment of road was designated as part a trans-America bicycle route by a private organization without National Park Service concurrence. Bicycles are ridden in the traffic lanes because there is no paved shoulder.

The Old Faithful/West Thumb road crosses the Continental Divide twice with several miles of sustained grades on the approaches. Traffic is often backed up by slow-moving vehicles. There are few turnouts to encourage slow vehicles to pull over, and many of the existing turnouts have abrupt pavement edges. Passing in certain places is difficult because of poor sight distance (distance the driver can see the roadway or objects on the roadway) due to roadway curvature and encroaching roadside vegetation. This less-than-adequate sight distance is considered a hazard to wildlife as well as motorists. The frequently heavy volume of oncoming traffic also limits safe passing opportunities.

Major turnouts such as Kepler Cascades, Isa Lake, Scaup Lake, and Shoshone Point require redesign because of safety problems resulting from inadequate site distance, deterioration, and original design for lower traffic volume. These turnouts are also often congested because of heavy use and poorly delineated parking spaces. The lack of separation between the through traffic lanes and parking areas creates safety problems at the major turnouts.

The Old Faithful bypass between the Biscuit Basin intersection and the upper Firehole River bridge, the West Thumb bypass, and the Lake bypass were reconstructed more recently and are showing a lesser, but still serious, degree of distress. This is partly because only the first stage lift of asphalt pavement was applied in the initial construction, and the final wearing course was never applied. The road widths of these segments are generally adequate for traffic.

Completion of the proposed rehabilitation and overlays would reduce existing road hazards and would improve the visitor's experience by providing a smoother driving surface with improved traffic and safety engineering characteristics. Access to major and minor turnouts would become more convenient and safer. Operational maintenance costs would be reduced and the life of the roadway would be significantly extended. Roadside vegetation management and vista clearing would also enhance the visual quality of the roadway.



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ALTERNATIVES CONSIDERED

ALTERNATIVE A (PREFERRED): REHABILITATE AND WIDEN ROAD TO 30-FOOT TOP WIDTH

The preferred alternative calls for rehabilitation of 25.62 miles of the Grand Loop Road and auxiliary features from the Biscuit Basin intersection to the upper Firehole River bridge, from the upper Firehole River bridge over Craig Pass to West Thumb, the West Thumb interchange and bypass, and the Lake Area bypass road between the Bridge Bay and Fishing Bridge intersections (see project location map). The work would be accomplished in two or more projects, subject to program authorization and availability of funds. Construction would last from two to five years, subject to traffic management and road closures (see below).

The 2.40 miles of the Old Faithful bypass road between the Biscuit Basin intersection (Milepost 47.93) and the upper Firehole River bridge (MP 50.33) would be rehabilitated to provide a top width of 30 feet, consisting of 11-foot lanes, 3-foot paved shoulders, and 1-foot stabilized gravel shoulders. Widening of the existing road base would be unnecessary. Areas of base failure would be excavated and repaired. Traffic control signs along the entire project would be replaced to meet standards of the Manual On Uniform Traffic Control Devices (MUTCD) (FHWA 1978). Most of the existing regulatory sign placards meet standards, however the posts are generally not of breakaway design and/or are too close to the traffic lane. Rustic wooden signs would be retained. These signs would be raised and mounted on breakaway posts.

The 17.0 miles of road and auxiliary features between the upper Firehole River bridge (MP 50.33) and the West Thumb interchange (MP 67.33) would be rehabilitated to provide a new top width of 30 feet. This would consist of a 28-foot asphalt surface of 11-foot traffic lanes and 3-foot paved shoulders, plus 1-foot stabilized gravel shoulders. The existing pavement width is 22 to 26 feet, necessitating widening of the road base from 4 to 8 feet per side to accommodate the wider and higher pavement surface. Along flat terrain segments of road, the construction limit (limit of surface disturbance) would be at least 15-25 feet from the edge of the existing pavement, or approximately 10 feet from the base of the existing slope.

Whenever possible, road base widening would be confined to one side with the center line shifted accordingly to avoid important historic or natural features, or large cut and fill slopes along the roadside. Center line shifts would be dependent on existing geometry and would comply with standard safety design principles.

Much of this segment of road is on rolling or steep terrain with numerous cut and fill slopes that would be disturbed to widen the road base, to improve safety characteristics, to stabilize slopes, or to promote revegetation on a case-by-case basis. Excavation into stable rocky material would be made at a steep angle to minimize disturbance. Slope tops would be rounded back to reduce rock fall, and a wide ditch would be provided at the bottom to catch fallen rock. Dirt slopes would be flattened where required to reduce soil creep and promote revegetation. Clearing of forest for right-of-way widening would be done so that an irregular "feathered" edge remains. Vista clearing would be accomplished where appropriate to improve views from the roadway.

The road would be widened at the DeLacy, Dry, and Herron creek crossings by building retaining walls along the fill slopes, and then adding fill to expand the top width. The existing 10-foot-wide concrete box culverts would be modified with baffles to assist passage by spawning trout. The stone masonry headwalls would not be affected.

There are 96 steel pipe culverts with stone-faced masonry headwalls that would be replaced with longer pipe to accommodate the wider road. The stone headwalls that are visible from the road, other visitor use areas, or that are determined to be architecturally significant would be documented, dismantled, and later reassembled over the new culvert pipes. The other headwalls would be documented, dismantled, and the stone salvaged for rehabilitation of other stone structures in the park. The Spring Creek culvert would be modified to allow spawning fish to pass. This could be done by installing pipe with cross baffles to provide pools, and/or lowering the grade of the culvert to reduce the vertical plunge at the downstream.

Several alternative types of guardrailing were considered for replacement of existing log railing, which does not meet current federal safety standards. W-section, weathering-steel railing mounted on wooden posts (meets standards) is preferred at this time. Also considered were steel-backed, square-timber railing (meets standards), and steel-backed, 3/4-log railing (may shortly meet standards). The final choice of guardrailing would be based on meeting federal safety standards, and historical compatibility of railing material.

Unnamed paved and gravel-surfaced turnouts and parking areas would be modified on the basis of circulation needs, parking capacity, sight distance, and historical significance. Eight turnouts would be eliminated due to safety reasons and 30 turnouts would be enlarged, paved, and striped. Paved acceleration/deceleration lanes would be provided at selected turnouts.

Named turnouts such as Kepler Cascades, Scaup Lake, Isa Lake, and Shoshone Point would be redesigned and rebuilt to retain historic scale and continuity. Materials such as logs, timbers, and native stone would be the primary materials used for curbing, safety islands, walls, and walkways.

The Kepler Cascades turnout would be modified by shifting the road alignment slightly to the north, and the parking area enlarged, overlaid, striped, and divided from the road by a vegetated safety island. Acceleration/deceleration tapers would be added. The Lone Star Geyser trailhead parking would be maintained as a separate turnoff from Kepler Cascades. The parking area would be enlarged, paved, and striped (see concept sketch).

The Scaup Lake turnout would be modified to improve sight distance for turning traffic, to eliminate a shallow drainage ditch, and to provide a median area between the road and parking. A boardwalk path to the lake shore would be built, and the shoreline slope adjacent to the turnout would be stabilized and revegetated (see concept sketch).

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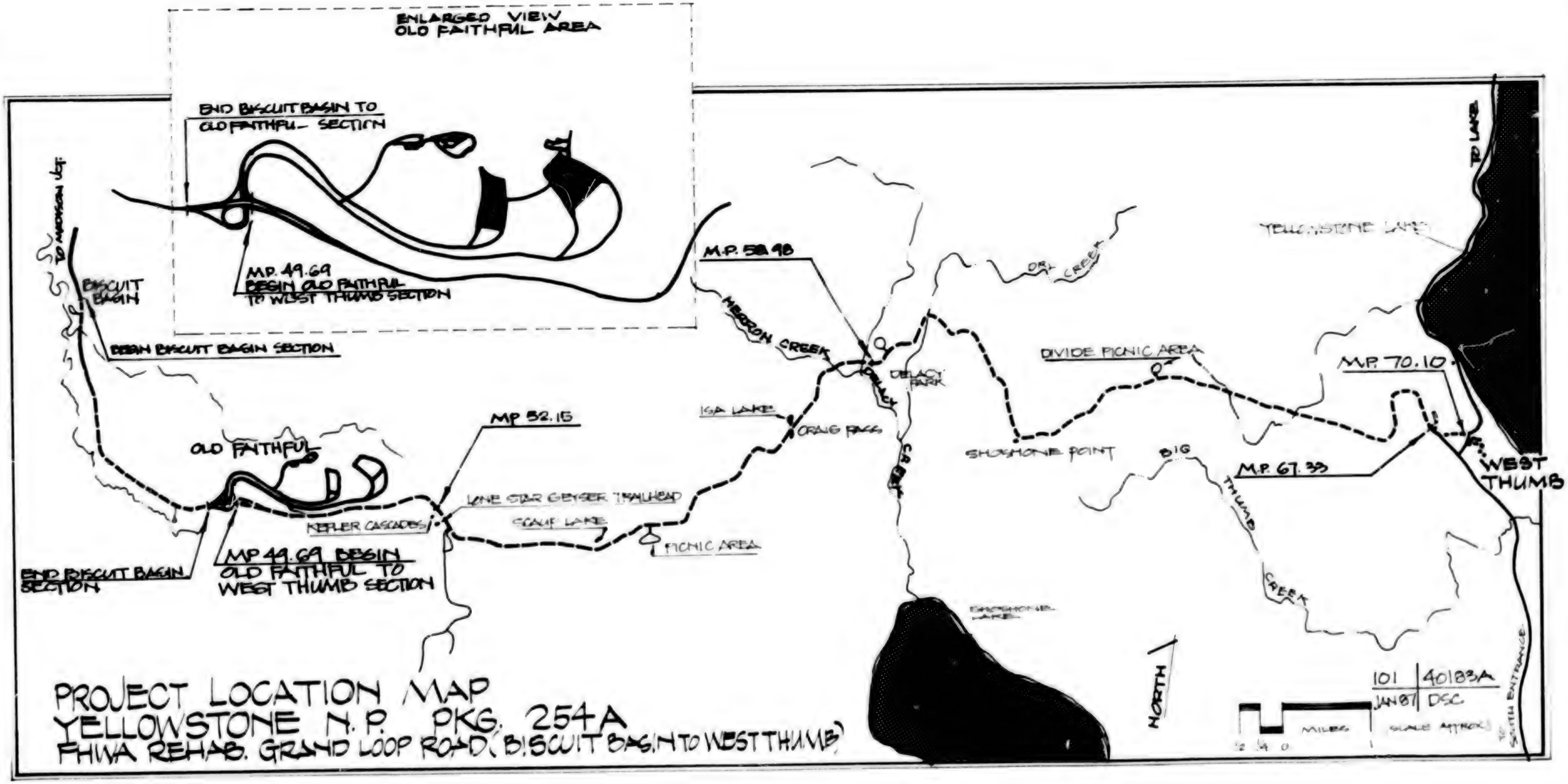

PROJECT LOCATION MAP
YELLOWSTONE N.P. PKG. 254A
FHWA REHAB. GRAND LOOP ROAD (BISCUIT BASIN TO WEST THUMB)

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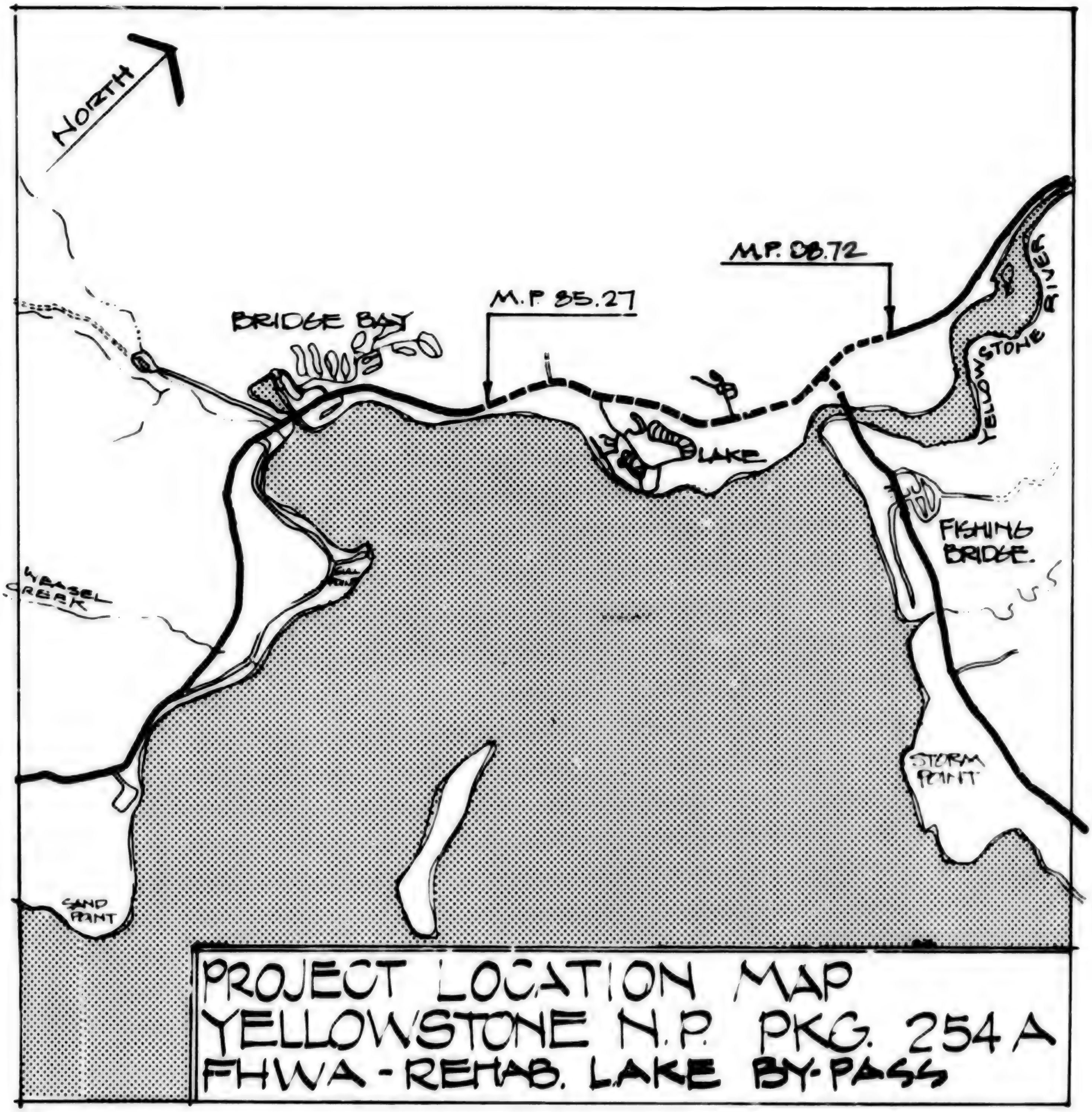

PROJECT LOCATION MAP
YELLOWSTONE N.P. PKG. 254 A
FHWA - REHAB. LAKE BY-PASS

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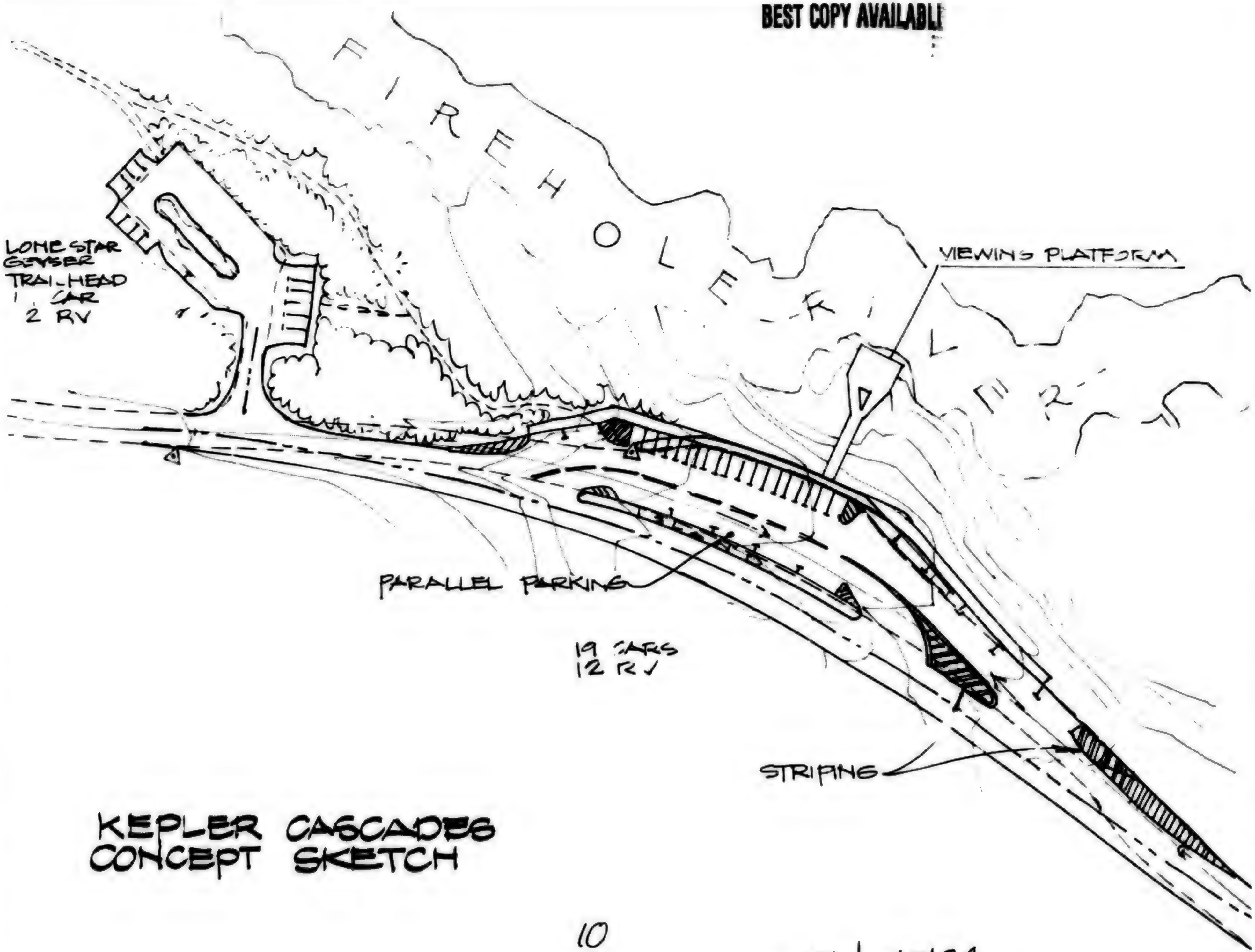

KEPLER CASCADES CONCEPT SKETCH

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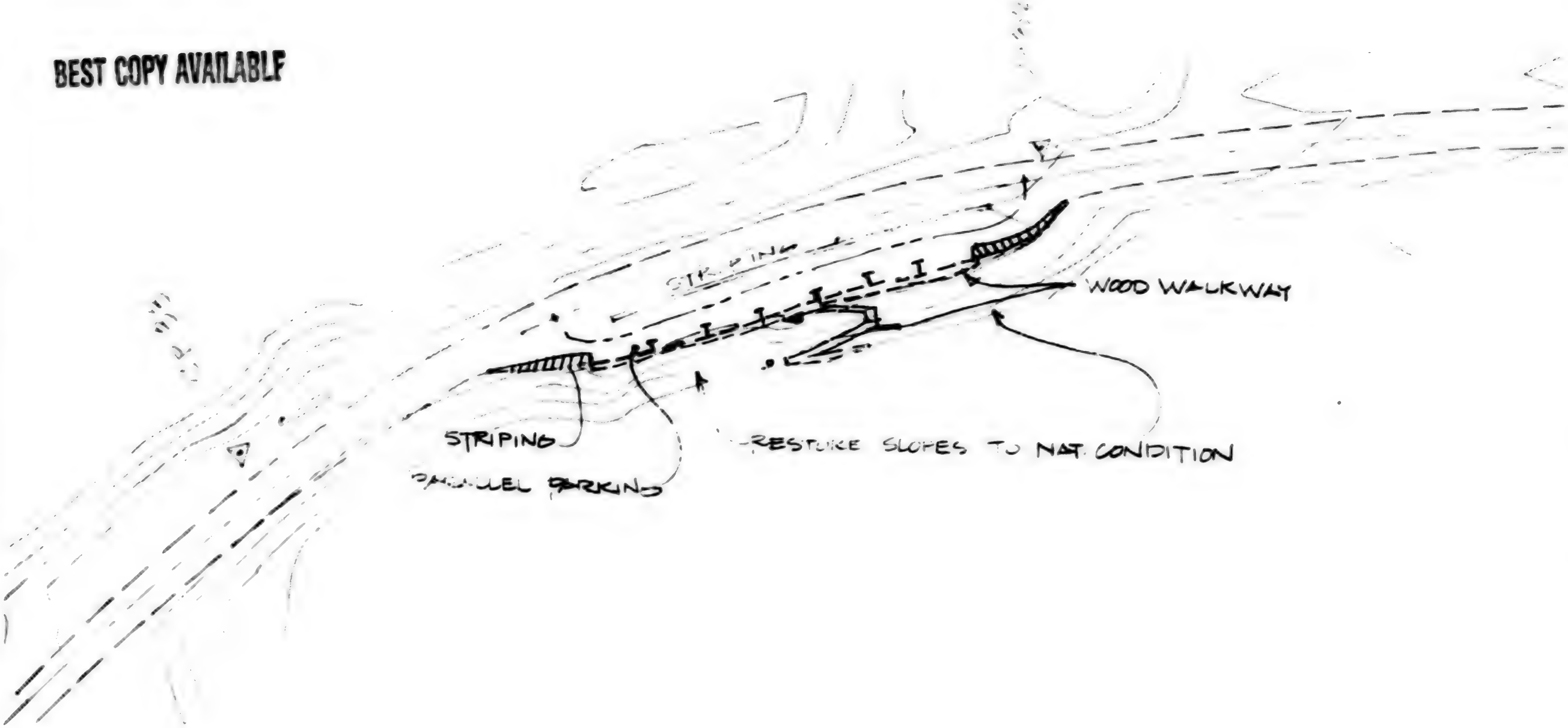

SCAUP LAKE CONCEPT SKETCH

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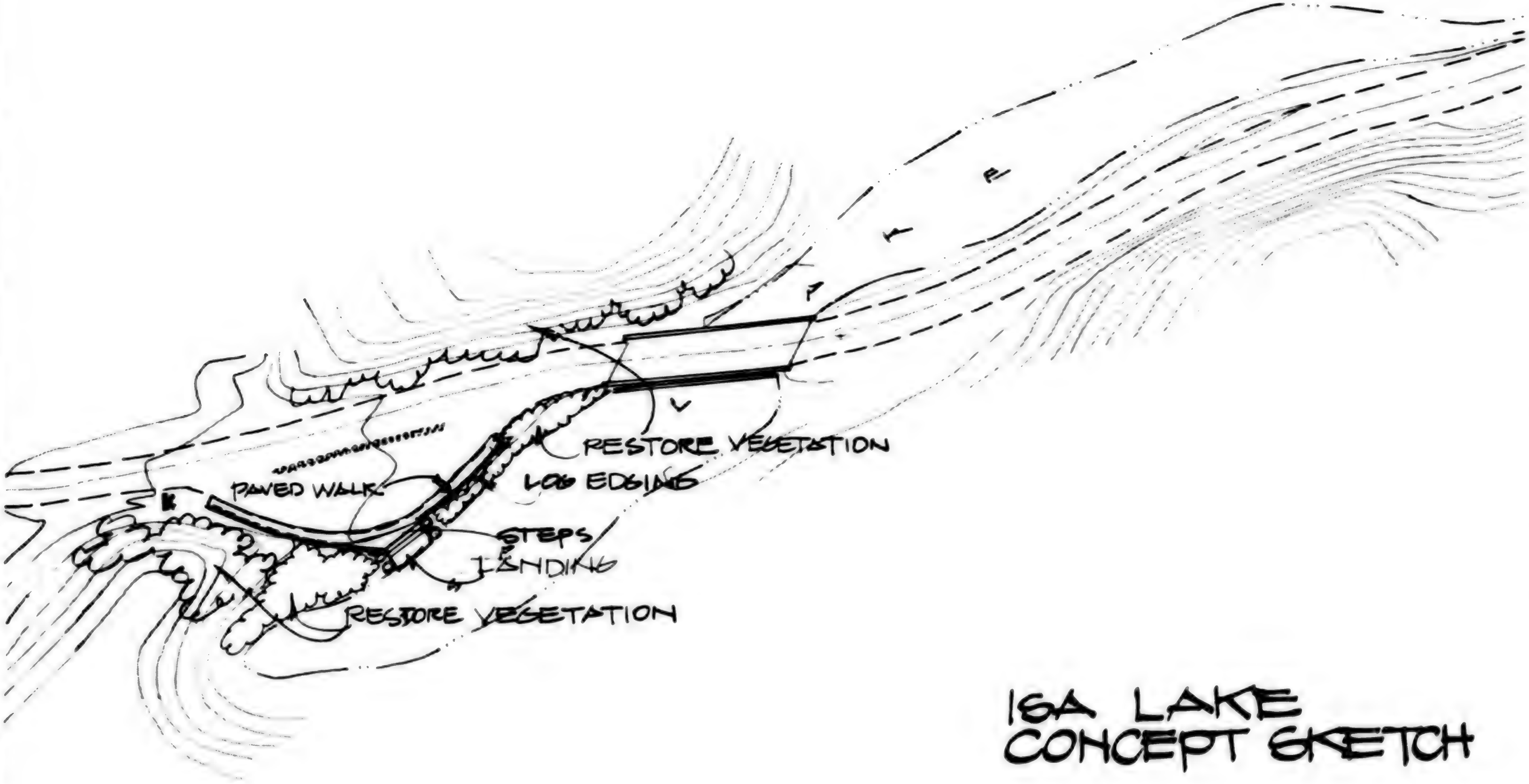

ISA LAKE
CONCEPT SKETCH

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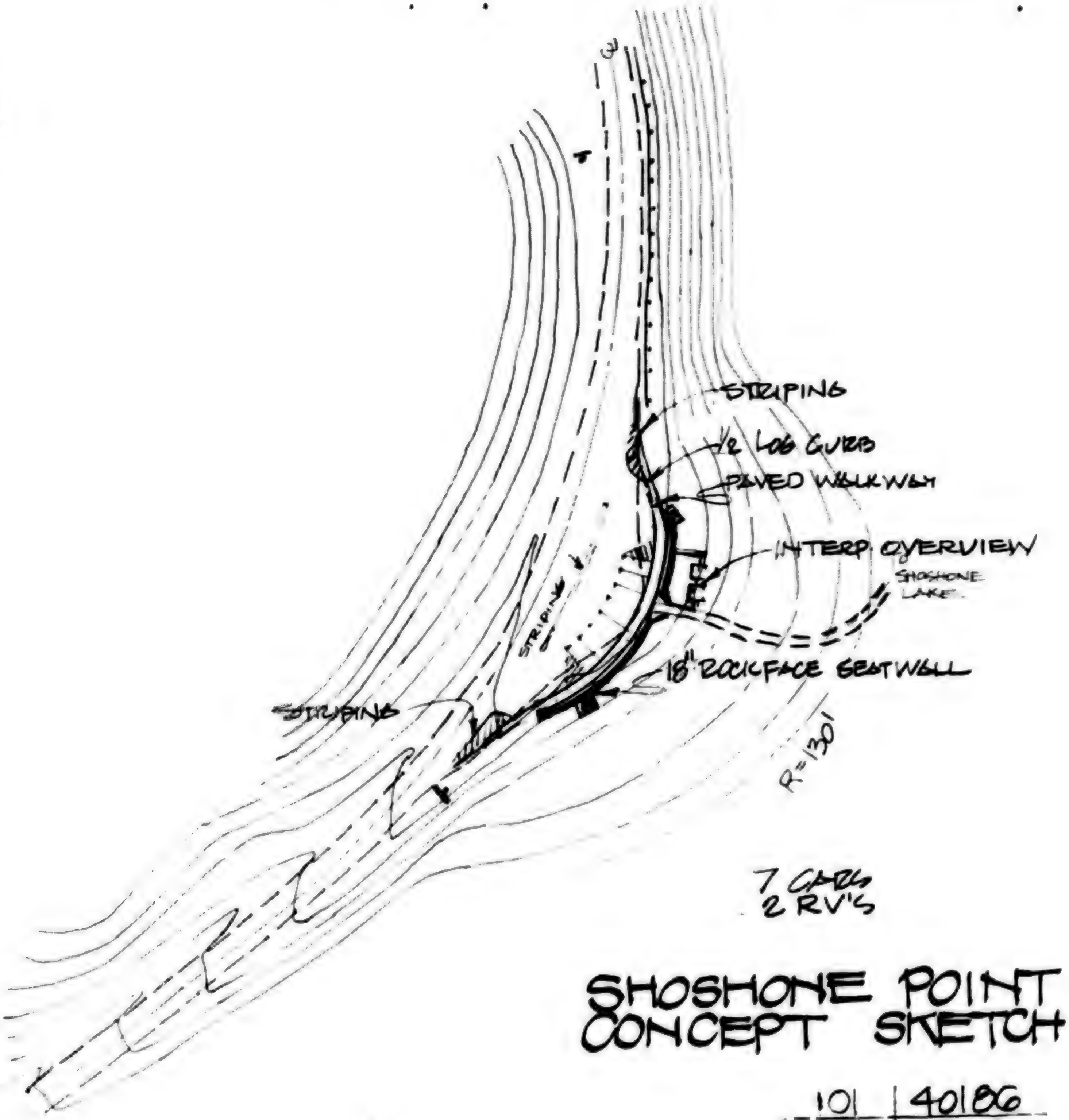

SHOSHONE POINT CONCEPT SKETCH

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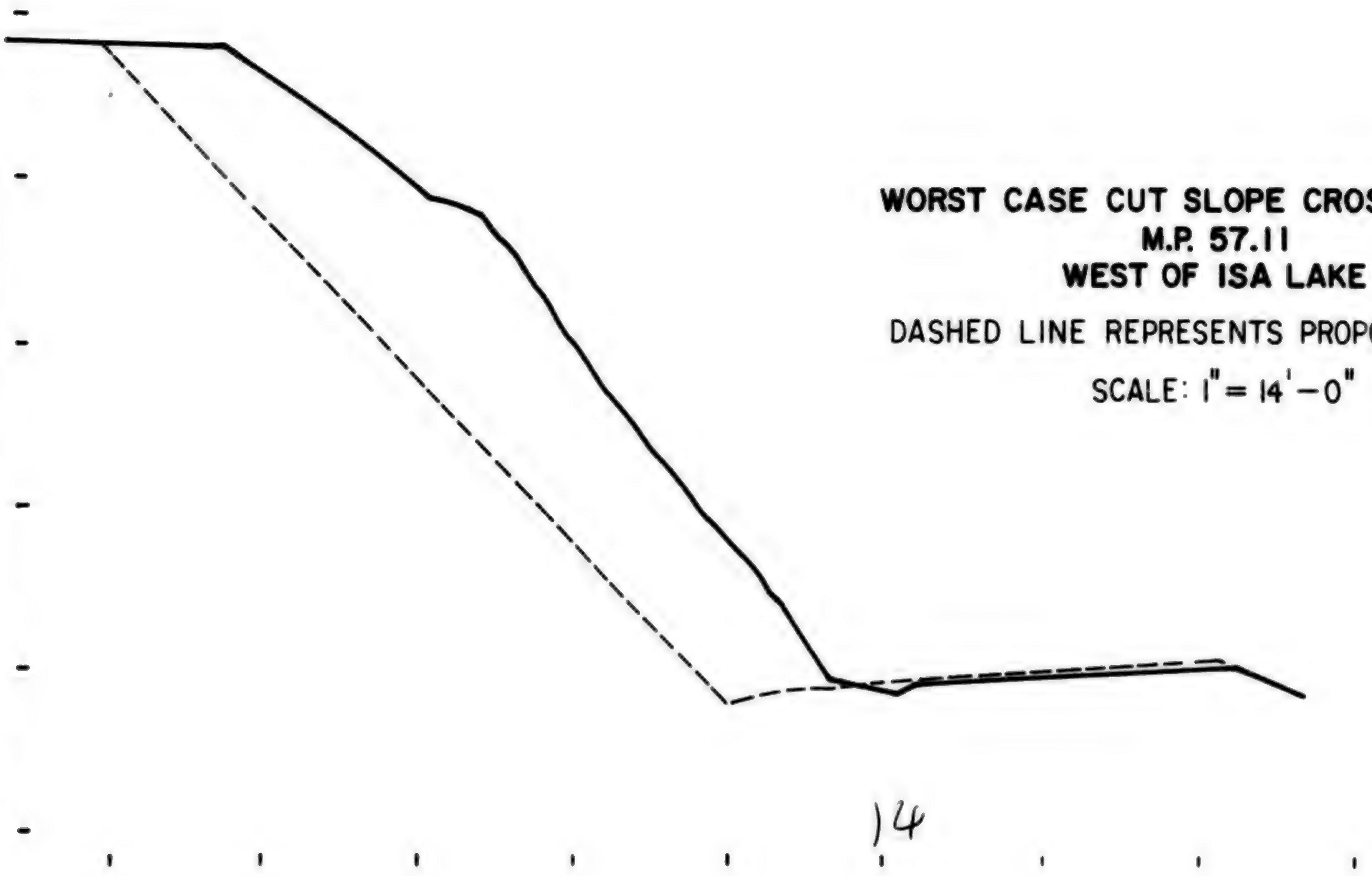

WORST CASE CUT SLOPE CROSS-SECTION
M.P. 57.11
WEST OF ISA LAKE

DASHED LINE REPRESENTS PROPOSED ACTION

SCALE: 1" = 14'-0"

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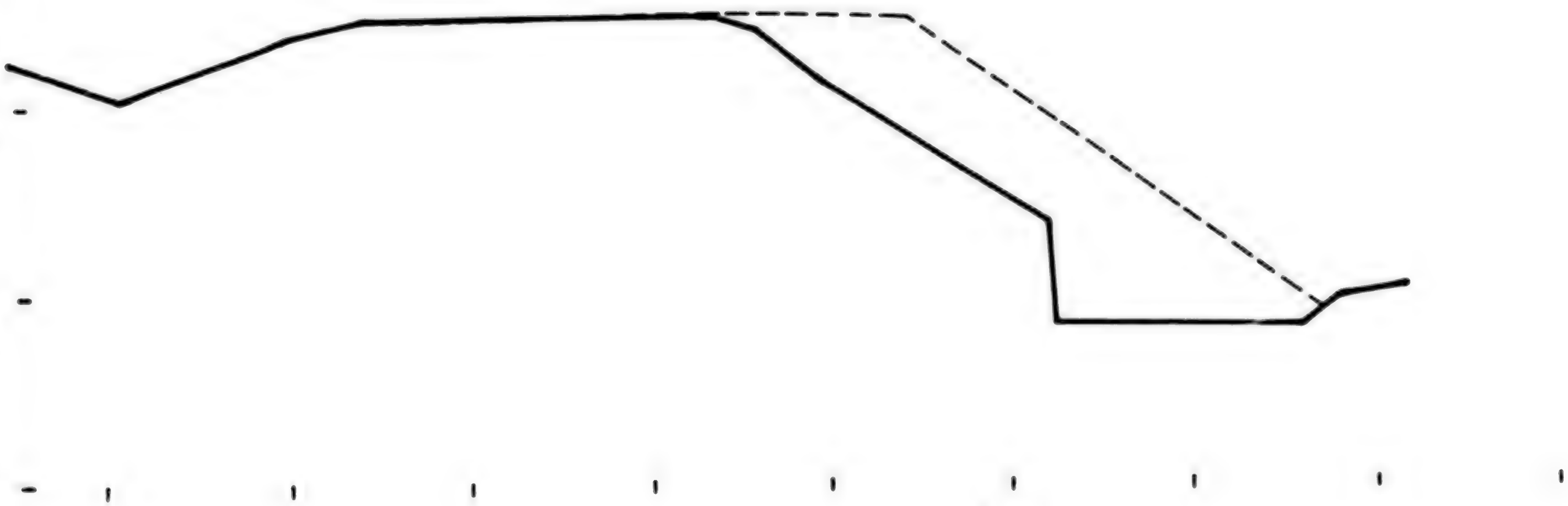
WORST CASE FILL SLOPE CROSS-SECTION
M.P. 52.30
WEST OF ISA LAKE

DASHED LINE REPRESENTS PROPOSED ACTION

SCALE: 1" = 14'—0"



The existing log bridge crossing Isa Lake would be retained with consideration given to preserving the historic and scenic qualities of the area while improving safety and circulation. The road alignment west of the bridge would be shifted north to improve the approach angle to the bridge. This would require cutting into and stabilizing the slope above the road west of the bridge. The existing turnout parking area would be used and a hardened trail built to the lakeshore nearest the center of the turnout (see concept sketch).

The West Thumb interchange would be modified to eliminate a curving bypass ramp in the northwest quadrant of the interchange. This ramp is a remnant of the old road prior to the 1973 modification of the interchange and provides a one-way bypass around the interchange for westbound traffic. The ramp creates confusion, including wrong-way traffic, and has contributed to accidents. The road base would be removed to the original grade and revegetated. An asphalt overlay would be applied to 2.77 miles of the interchange and West Thumb bypass (MP 67.33 to MP 70.10) to complete the wearing course, which was never applied. The road base is sufficiently wide for the proposed pavement width.

The 3.45-mile segment of the Lake bypass road from north of the Bridge Bay intersection (MP 85.27) to north of the Fishing Bridge intersection (MP 88.72) would receive a 28-foot asphalt overlay. The road base on this segment of road is sufficiently wide for the proposed pavement width.

Existing borrow sources outside the park would be utilized at the Snake River site near Flagg Ranch in the John D. Rockefeller Jr. Parkway, or at a commercial site near West Yellowstone, or both. Truck traffic for material hauling would be necessary over park roads and possibly through West Yellowstone (if the source near West Yellowstone is utilized). Crushing would be performed at the source. Staging areas and asphalt hot mix plants would be necessary in the park for asphalt production and equipment storage near the project. Staging areas would be near Grant Village (but not in the visitor area) and/or in the Old Faithful administrative area. Asphalt plants would conform to National Clean Air and Water Standards. Operations within the staging areas would be confined to previously disturbed areas. A reclamation plan for borrow sources and staging sites would be developed and implemented.

Erosion control would be implemented by utilizing filter fabric, check dams of straw bales, or similar materials and methods.

Construction workers would be trained and managed regarding the special sensitivity of park values, regulations, and appropriate housekeeping and behavior in grizzly habitat.

A revegetation management plan would be prepared by park staff and implemented as part of the rehabilitation project. Topsoil would be salvaged and reused where practical. Native grass and forb seed would be drilled or hydroseeded on disturbed slopes, and lodgepole pine seedlings planted on appropriate slopes. Strategies would be developed for managing exotic plant species which may become established after construction.

ALTERNATIVE B: NO ACTION

The current use and management of the above described road segments, auxiliary features, and intersections would continue. Maintenance activities such as pothole patching, periodic seal-coat applications, hazardous tree removal, and removal of rockfall and slumping debris would continue. No major modifications of alignments, slopes, turnouts, bridges, culverts, walls, guardrailings, or signs would be made.

ALTERNATIVE C: REHABILITATE EXISTING ROAD

Rehabilitation of the 2.40-mile road segment between the Biscuit Basin intersection and upper Firehole River bridge would consist of base failure repair and application of an asphalt overlay the width of the existing pavement. Signs would be replaced to meet MUTCD and NPS standards as described in alternative A.

The 17.0 miles of road between the upper Firehole River bridge and the West Thumb bypass would receive rehabilitation consisting of repair of base failure areas and application of an asphalt overlay on the the existing road top width, which varies from 22 to 26 feet in width. The shoulder would receive minor widening to reinforce the pavement edge.

The existing horizontal and vertical alignments would remain unchanged, and existing cut and fill slopes would be not be modified. Contributing features such as the stone masonry retaining wall, stone culvert headwalls, and the Isa Lake bridge would be used without modification. Log guardrailing would be replaced with weathering steel rail mounted on wooden posts, to meet federal standards. Traffic control signs would be replaced to meet NPS and MUTCD standards. Paved turnouts would be overlaid but not enlarged. Dirt-surfaced turnouts would be evaluated for retention and paving, or would be eliminated.

One culvert at upper Spring Creek would be replaced to eliminate a barrier to spawning trout, and baffles would be installed in the DeLacy, Herron, and Dry Creek culverts.

The West Thumb intersection and bypass would be modified and overlaid as in alternative A.

The Lake area bypass would receive an asphalt overlay.

Borrow sources and staging areas for asphalt production would be the same as in alternative A. The amount of material hauled over park roads would be reduced from alternative A. Crushed rock would be needed for asphalt production, but little fill material would be needed.

Traffic management would consist of short delays for one-way traffic to pass paving equipment. Construction would last two to three seasons.

ALTERNATIVE D: REHABILITATE AND WIDEN ROAD TO 32-FOOT WIDTH

In this alternative, the same segments of road and auxiliary features described in alternative A would be rehabilitated to provide a pavement width of 32 feet, consisting of 12-foot traffic lanes and 4-foot paved shoulders. Construction would last from two to five seasons, depending on phasing and traffic management (see below).

The Old Faithful bypass road segment between the Biscuit Basin intersection and the upper Firehole River bridge would receive base failure repair and an asphalt overlay. The road base would require widening to accommodate the overlay. Signs would be replaced to meet NPS and MUTCD standards as in alternative A.

The road between the Old Faithful bypass and the West Thumb interchange would receive base failure repair and and would be widened from 5 to 9 feet per side to accommodate an asphalt overlay for the 32-foot width pavement.

The existing horizontal and vertical alignments would be modified slightly as in alternative A to improve sight distance or to reduce natural or cultural resource impacts. Cut and fill slopes would be modified as in alternative A for road widening.

The masonry retaining wall and culvert headwalls would be preserved as in alternative A. The same road widening methods utilizing retaining wall would be used at the DeLacy, Herron, and Dry creek crossings. Culverts would be modified for fish passage as described in alternative A.

Existing log guardrailing and signs would be replaced as in alternative A.

Unnamed turnouts would be evaluated and modified as in alternative A. Named turnouts would be modified and paved as described in alternative A.

The West Thumb interchange and bypass would be modified as described in alternative A, with a 32-foot overlay applied.

The Lake bypass segment between Bridge Bay and Fishing Bridge intersections would receive base failure repair and a 32-foot asphalt overlay. The existing road top is 34-38 feet wide, which would accommodate the new 32-foot pavement without base widening. The existing pavement surface is 30 feet wide.

The location of the borrow sources, hot mix plants, crushers, and staging areas would be the same as described in alternative A.

The development and implementation of a roadside revegetation plan and borrow site reclamation plan would be the same as described in alternative A. Truck traffic for material hauling would be similar to alternative A.

Training of construction workers would be the same as alternative A.

TRAFFIC MANAGEMENT ALTERNATIVES (FOR REHABILITATION ALTERNATIVES A AND D)

Traffic closure alternatives are under consideration along with the major rehabilitation alternatives (A and D) for the road segment between the upper Firehole River bridge and the West Thumb interchange. In all traffic management alternatives, there would be a public information campaign to inform visitors of construction delays via appropriate park, local, state, and regional media. The total length and cost of the construction would be directly affected by traffic management (see Environmental Consequences, Traffic Management Alternatives below). The estimates for construction time and cost in all alternatives could be increased if there is a funding shortfall. This could require the breaking of the project into two phases and would affect all alternatives equally. Daytime construction with flagged traffic is considered infeasible because the high traffic volume that normally uses the road would exceed the capacity of the road if managed for one-way traffic with construction delays.

Traffic Management Alternative A

Traffic management alternative A would entail total closure of the road to visitor traffic for two seasons, to allow uninterrupted daytime construction work. Time for construction may be increased part of an additional season, but the road would not be closed to visitors during this additional period. This alternative would require traffic traveling through the park between the west or south entrances to be routed via Madison, Norris, Canyon, Lake, and West Thumb junctions, increasing travel 30 miles (one-way) compared to travel between the west and south entrances via Old Faithful. Visitors wishing to see Old Faithful would have to drive an additional 32-mile round-trip from Madison junction. Visitors making a one-day, round-trip from Jackson to Old Faithful would have to drive an additional 124 miles.

Traffic Management Alternative B (NPS Preferred)

Traffic management alternative B would entail night closure between approximately 9 p.m. and 9 a.m. (the actual hours are subject to change) during the main visitor season to allow uninterrupted construction work at night, with minimal daytime work. A two-lane surface would be restored at the end of each work shift to allow daytime two-way visitor traffic between approximately 9 a.m. and 9 p.m.. Occasional jobs such as installing culverts, major excavation, or paving may require day work and sections of one-way traffic with flagging and possible short delays. Nightly closure would last portions of three seasons. The road may be closed to all visitor traffic for uninterrupted construction after Labor Day.

Traffic Management Alternative C

Traffic management alternative C would entail nighttime construction and one-way flagged traffic between approximately 9 p.m. and 9 a.m., with nighttime construction work. The road would be open to two-way daytime traffic between 9 a.m. and 9 p.m., with minimal daytime construction work. Construction would last for portions of four seasons.

AFFECTED ENVIRONMENT

NATURAL ENVIRONMENT

The rock and soil substrate in this area of the park is closely linked to the volcanic past of the Yellowstone region. The road between Biscuit Basin and the Old Faithful area passes through a relatively flat geothermal basin with hot springs and water-deposited geyserite rock near the road. Between Old Faithful and West Thumb, the road climbs through mountainous terrain with two small adjacent geothermal areas, twice crossing the Continental Divide. One small thermal area is under the existing road 0.55 mile east of the upper Firehole River bridge. Hot air issues from a culvert. The other thermal area is adjacent to the roadway 0.6 mile east of Shoshone Point.

There are many steep cut slopes above the existing roadway, some of which are composed of structurally weak rhyolite or compacted volcanic ash and pumice. The steep slopes or cliffs adjacent to the road tend to be unstable and crumble or slump onto the roadway. Soils derived from rhyolite are high in feldspar content, which degrades into clays and silts in moist areas. This allows localized areas of the road base to hold moisture, causing frost boils and subsequent base and pavement failure. Between West Thumb and Fishing Bridge along Yellowstone Lake, many areas of clay/silt-like lake-deposited soils underlie the roadway. These soils also hold moisture and provide an unstable base foundation.

Roadside vegetation communities adjacent to the road between the Biscuit Basin turnoff and the upper Firehole River bridge consist of a mixture of dry grass/forb meadows and stands of open lodgepole pine forest. One 0.15-mile section of road crosses a hot spring outflow deposit of geyserite that is devoid of vegetation. From the upper Firehole River bridge to West Thumb, the predominant plant community along the road is lodgepole pine forest succeeding to sub-alpine fir and Englemann spruce, with an understory of grouse whortleberry and grasses. Occasional small meadow openings in the forest are of varying degrees of wetness. These range from well-drained sedge/grass/forb meadows with invading lodgepole pine, to poorly drained moist meadows with such plant species as horsetail and buttercup, to permanent wetland bogs with such water-loving species as sedges, rushes and willows. Between Bridge Bay and Fishing Bridge, the road passes through a mixture of dry and wet meadows and older lodgepole pine/subalpine fir/Englemann spruce forest. Non-native vegetation has invaded elsewhere along park roads and disturbed areas, but generally does not occur along these sections of road.

Wildlife such as ground squirrels, tree squirrels, other rodents, mule deer, elk, bison, coyotes, and black and grizzly bears use the meadows along the route and cross the road corridor in transit to other areas. Bison, elk, and deer over-winter and calve in the meadows of the Upper Geyser Basin near Old Faithful. Birds such as gray jays, ravens, chickadees, hermit thrushes, and woodpeckers utilize the forest habitat along the road, and waterfowl use the ponds.

The threatened grizzly bear (Ursus arctos horribilis) ranges throughout the project area. Carcasses of winter-killed elk, deer, and bison in the Upper

Geyser Basin provide an important food source between late March and early June for bears coming out of hibernation. Grizzlies also hunt elk calves and squirrels in the area. As spring progresses, bears move up into higher elevations, feeding on succulent spring vegetation. The area between the Biscuit Basin intersection and the upper Firehole River bridge is high quality grizzly habitat during spring, and medium quality during summer and autumn. The area adjacent to the road between the upper Firehole River bridge and West Thumb is generally low quality habitat, with low use other than transitory movements. The Fishing Bridge area is high quality spring and summer grizzly habitat, becoming even more important in autumn. Bear sightings are numerous in this area during the visitor season. Habitat reduces in quality as one moves from Fishing Bridge south toward the Lake and Bridge Bay areas. Grizzly bears are highly mobile and cross road corridors in transit to other food source areas. The Interagency Grizzly Bear Study Team has determined that all park roads displace grizzlies to some degree. It is not suspected that proposed road improvements or construction activities will materially change this effect.

The endangered bald eagle (Haliaeetus leucocephalus) nests along Yellowstone Lake and the Yellowstone River, with the nearest active nest at least 5 miles from Fishing Bridge. Eagles feed on cutthroat trout in Yellowstone Lake and on spawning cutthroat trout in the tributary streams during early summer. The endangered peregrine falcon (Falco peregrinus) and endangered whooping crane (Grus americana) are also found in the park, but do not use areas that would be affected by the project.

Water resources along the route include the Firehole River; Spring, Herron, and DeLacy creeks; numerous small intermittent creeks running under the road through culverts; numerous unnamed seeps and springs along the road slopes or adjacent meadows; the small pothole lakes of Scaup, Isa, and two unnamed ponds; and nine small wetlands. Some of the unnamed creeks are used by spawning fish. The spring spawning fish are the native cutthroat trout and introduced rainbow trout. The fall spawning fish are brook and brown trout, which are both introduced. One culvert where the permanently flowing branch of Spring Creek passes under the road approximately 0.7 mile west of the Isa Lake bridge has been identified by U.S. Fish and Wildlife Service (FWS) personnel as a barrier to spawning trout due to an 18-inch stream drop at the downstream end of the culvert. The concrete box culverts at the crossings of De Lacy, Dry, and Herron Creeks impede fish passage at low water, due to the flat concrete floors of the culverts.

Nine small palustrine wetlands are found adjacent to a total of 1100 linear feet of the roadway and would be affected by fill placement for slope extension or road base widening. These are between 0.1 mile west of the upper Firehole River bridge to just east (and south of the road) of Isa Lake. This terrain is hummocky and poorly drained, with numerous potholes and wetlands scattered about. Vegetation varies from moss-lichen saturated with water to sedge, horsetail, rushes, and willow growing in standing water. None of the wetlands appear to be critically important habitat to birds or mammals, due to displacement by the noise and disturbance from the adjacent road. All of the wetlands adjacent to the roadway were previously affected by the road construction in the 1930s, which either created them by disturbing the natural drainage, or partially filled them in. None of these are significant visitor attractions at turnouts, and most are barely noticeable from the road.

The lower crossing over the Firehole River is a potential floodplain, however there is no evidence of flooding. The two Firehole River bridges were built in the 1970s. Park roads are exempt from compliance with E.O. 11988 "Floodplain Management" under NPS procedures for implementation.

The park is designated as a class I area under the Clean Air Act. Air quality is generally good, with occasional periods of regional haze, forest fire smoke, or widely dispersed industrial pollution. Some acid precipitation has been documented. Traffic using the road undoubtedly produces air pollutants, although this has not been monitored and documented.

Visual quality from the roadway is generally excellent and most adjacent slopes have revegetated since construction of the road in the 1930s. Some steep cut slopes are unstable and have resisted colonizing vegetation due to slumping or rockfall. The visual effect between Old Faithful and West Thumb is generally that of a narrow road in a narrow swath cut through dense forest. Trees grow up to the road shoulder along many segments of road, screening views of meadows and wetlands. The other segments of road provide a visual effect of a wider road passing through alternating meadows and forest, with a wider cut swath providing greater visibility from the roadway.

CULTURAL ENVIRONMENT

Archeological Resources

An archeological survey of the proposed project corridor was completed by the NPS Midwest Archeological Center in September, 1986. This survey included the verification of previously recorded sites along the Biscuit Basin/Old Faithful bypass segment and a first-time on-site evaluation of the Old Faithful/West Thumb segment. The Lake Area bypass segment had been previously surveyed and no additional survey work was required.

No archeological sites were found along the Old Faithful/West Thumb road segment and the NPS has determined that none of the existing sites along the Biscuit Basin/Old Faithful bypass segment or the Lake Area bypass segment would be affected by this proposed project. No additional archeological survey work would be required for this project unless additional resources are discovered during reconstruction activities. If archeological materials were discovered during reconstruction, work would be halted until a proper evaluation of the site or sites could be completed. The primary mitigating measure would be site avoidance or excavation if necessary.

Historic Resources

A Determination of Eligibility for the road and its associated sections was submitted to the Wyoming State Historic Preservation Office (SHPO). The SHPO concurred with the NPS on its determination that the segment of the Grand Loop Road between Old Faithful and West Thumb (MP 52.15 to MP 67.33) is eligible for entry on the National Register of Historic Places, and that the segment from the Biscuit Basin parking area (MP 47.93) to east of the upper

Firehole River Bridge (MP 52.15) is not eligible. Contributing resources of the eligible segment include the Isa Lake Bridge and stone retaining wall; the Herron Creek, DeLacy Creek, and Dry Creek large culverts and headwalls; approximately 96 small stone-faced culverts; log guardrailings; and the Kepler Cascades, Isa Lake, and Shoshone Point turnouts. This road section--including the roadway itself, turnouts, retaining walls, bridges, culverts, guardrailings, signs, bench markers, kiosks, and landscape features--was surveyed and evaluated by NPS cultural resource specialists from Yellowstone National Park and the Rocky Mountain Regional Office.

The contributing factors for eligibility of the Grand Loop systems are the configuration of the road and the fact that the original intent of giving accessibility to the major geologic and scenic wonders is still intact, and that the Grand Loop Road has evolved into a historic landscape. The design represents the U.S. Army's influence from 1886-1916. The present appearance represents the National Park Service's role in landscape architecture from 1916 to 1947. The use of the road has remained the same; however, a historic landscape is not static but is always changing to meet weather and geologic concerns. The Grand Loop Road does not exist today exactly as it was first constructed. The road alignments, width of road, surfacing materials, and traffic patterns have been altered many times. Only if these elements are altered in an incompatible manner would they detract from the historic landscape. A good example of a noncontributing alteration is the Biscuit Basin parking area and the Old Faithful interchange.

It was not the road alignment, width of the road, surfacing material, or traffic pattern that was nominated; rather, it was the historic site and setting of the configuration and the historic landscape that evolved. Contributing resources such as log guardrailings, stone masonry guardrailings and culvert works, significant bridges, and pullouts with landscaping features are considered as features contributing to the historic landscape.

Formal consultation would be continued by the regional office with the Wyoming SHPO and the Advisory Council on Historic Preservation in accordance with the Programmatic Memorandum of Agreement of September 9, 1981. All necessary mitigation would be performed in accordance with Cultural Resources Management Guidelines (NPS-28), and the secretary of the interior's Standards for Archeology and Historic Preservation.

SOCIOECONOMIC/VISITOR USE ENVIRONMENT

Visitor travel is the predominant use between Old Faithful and West Thumb and along Yellowstone Lake. Traffic is a mixture of private automobiles, large recreational vehicles, tour buses, trucks, and some bicycles. Bicycle traffic is not recorded on this portion of the road. Many recreational vehicles are rented and drivers are inexperienced and unskilled in the operation of vehicles that are up to 8 feet, 6 inches wide, plus 18 inches on either side for side mirrors. The Old Faithful/West Thumb segment is one of several park roads connecting the communities of West Yellowstone, Gardiner, Cody, and Jackson. An alternate route is the road between Norris and Canyon junctions. The Lake area bypass connects the communities of Cody, Gardiner, and Jackson.

Commercial through traffic is prohibited in the park, although there is some contractor traffic and park concessions depend on the road for supplies and maintenance. The road is not plowed during the winter, but is groomed for heavy snowmobile traffic.

Business inside and adjacent to the park is heavily dependent on the tourism that uses the park roads.

ENVIRONMENTAL CONSEQUENCES

ALTERNATIVE A (PREFERRED): REHABILITATE AND WIDEN ROAD TO 30-FOOT TOP WIDTH

Natural Environment

The roadway between the Biscuit Basin turnoff and the upper Firehole River bridge was rehabilitated in the 1970s and has a sufficiently wide base to accommodate a 28-foot asphalt overlay. The adjacent slopes, soil, or vegetation would not be disturbed except in areas of localized base failure excavation and repair.

Between the upper Firehole River bridge and the West Thumb interchange, the proposed top width would require widening of the road base with disturbance to existing cut/fill slopes as described under "ALTERNATIVES CONSIDERED". Disturbance would consist of clearing and removal of vegetation and topsoil, burial of existing surface material under fill material to extend fill slopes, soil compaction, and excavation and grading of cut slopes. Approximately 85 acres (5 acres per mile) of soil and vegetation would be disturbed for road widening between the upper Firehole River bridge and the West Thumb interchange. Of this, approximately 80 per cent, or 68 acres, would be on ground previously disturbed by road construction in the 1930s, and approximately 20 per cent, or 17 acres would be on undisturbed vegetation. The majority of disturbed area would revegetated in several years.

Enlarging the Kepler Cascades turnout, Lone Star Geyser trailhead, and several unnamed turnouts would result in similar disturbance to soil and vegetation as from widening the road, affecting approximately 4-6 acres of lodgepole pine forest.

The Lake area bypass road between Bridge Bay and Fishing Bridge has a 30-foot pavement width and a 34- to 38-foot shoulder-to-shoulder width. This would accommodate a 28-foot overlay with minimal disturbance of adjacent soil and vegetation, except in localized areas of base excavation and repair.

The soils and climate are conducive to regrowth by lodgepole pine seedlings, forbs and grass on disturbed slopes. Trees would become established on the slopes in 10-20 years and eventually close in the road swath. Salvaged topsoil would be reused when possible. Imported soil may be necessary to aid revegetation. Exotic plants may colonize the gravel shoulder and disturbed roadside slopes. Previously disturbed areas used as borrow sources or staging areas would be reclaimed and revegetated.

There would be minimal effect on habitat for roadside-dwelling invertebrates, rodents, and birds adjacent to the road segment between Biscuit Basin and the upper Firehole River bridge, the West Thumb interchange area, and the Lake bypass segment. Some displacement of larger wildlife may occur due to construction activity creating noise, dust, and fumes, although these areas are already disturbed by existing traffic.

Along the segment between the upper Firehole River bridge and West Thumb, habitat for roadside-dwelling invertebrates, rodents, and birds would be lost due to vegetation clearing. Birds and larger mammals such as elk and black bear would be temporarily displaced due to the disturbance of construction noise, dust, fumes, and lights. The new wider roadway may have several effects on the vehicle/wildlife accident rate. Accidents may initially be reduced by the improved visibility offered by the increased road width and cleared slopes, until lodgepole pine growth encroaches on the roadside in 10-20 years. The improved road would encourage faster traffic at night when most wildlife accidents occur, which may increase the vehicle/wildlife accident rate. The initial growth of grass and forbs on revegetated slopes would attract herbivores and bears, resulting in slowed traffic and increased hazard. The overall effect may be to increase the vehicle/wildlife accident rate. The existing disturbance and displacement of wildlife by traffic using the road corridor would continue.

Effects on grizzly bears by construction activity would probably not exceed existing displacement from normal traffic on park roads. Food sources would not be affected in the long term by construction, although there is potential for short term disruption of food source utilization due to displacement. The meadows of the Upper Geyser Basin near Old Faithful are sensitive food source areas where winter-killed animal carcasses are consumed by bears coming out of hibernation in the spring. There is potential for significant disturbance to grizzlies there if construction between Biscuit Basin and the upper Firehole River bridge began before early June. For this reason, construction activities will be restricted to times that would not adversely affect bears. The soil and vegetation disturbance between Old Faithful and West Thumb would not significantly affect grizzly food sources due to the low quality of habitat resulting from the vegetation type and existing road disturbance. Modification of culverts to enhance spawning may improve a food source. Road rehabilitation would not adversely affect grizzly bear food sources such as spawning streams along the Lake bypass segment.

Bald eagles may be temporarily displaced in their daily movement, although this is not expected. Peregrine falcons and whooping cranes are not known to use the project areas and would not be affected.

Small streams crossing the road may be temporarily affected by siltation during replacement or modification of culverts, by burying invertebrates or by disrupting spawning. Spring cutthroat trout spawning occurs during normally turbid runoff conditions, which would be little affected by somewhat increased turbidity of construction activity. Fall spawning brook and brown trout are introduced species, which may be temporarily affected by silt. Siltation would be minimized by precautions taken to prevent erosion. The bridges across the Firehole River and Isa Lake and the large culverts at DeLacy, Herron, and Spring Creeks would not be affected, nor would these waters. A pipe culvert on Spring Creek would be replaced or modified, and concrete culverts on DeLacy, Dry, and Herron Creeks would be modified to aid passage by spawning trout. This would improve trout reproduction success and increase a food source to consumers of trout, such as bears.

Floodplains would not be affected.

Portions of nine small wetlands would potentially be affected by fill placed to widen the road base. Widening may be performed on the road side opposite the wetland with a corresponding shift of centerline alignment depending on constraints such as steep slopes above the road requiring excessive excavation or alignment geometry requirements. Approximately 0.25 acre of wetland could be destroyed by fill, pending final centerline alignment. This would have little affect on birds or mammals, due to limited use of these areas as a result of the disturbance caused by the adjacent road. Habitat for invertebrates would be eliminated by burial under fill. Effects on natural wetland values beyond the actual area covered by fill would be negligible. Beneficial values that wetlands provide persons, such as open space, improved water quality, and water storage, would not be adversely affected. The variety of roadside viewing opportunities may be improved if existing screening forest cover is removed or thinned in the process of road widening. Major realignment of the road to completely avoid wetlands would require construction of several miles of new road corridor, creating prohibitive environmental impacts.

Effects on air quality would include a temporary local increase of dust, fumes, and smoke from construction activity along the project. Hydrocarbon emissions would occur at the hot mix plants at the staging areas, and dust would be produced from crusher operations at the borrow sites. Dust, fumes, and noise from trucks hauling material from the burrow source would affect visitors using the south entrance road and Flagg Ranch, and possibly the community of West Yellowstone, the west entrance road, and Old Faithful area. Slash burning would be reduced by chipping small tree material for use as mulch in revegetation. Slash may be burned along the roadside, resulting in smoke and locally reduced visibility. If this were performed in the fall, fewer visitors would be affected, but ventilation would be reduced. Any burning will be conducted according to state air quality regulations. Dust, fumes, smoke, and noise would have a temporary effect on the visitor's experience while traveling through the construction areas. Traffic and motor vehicle emissions would be expected to return to long-term trends after construction is completed.

Visual quality of the roadside would be affected by the increased opening resulting from forest clearing for road widening and cut/fill slope modification. Several unstable cut slopes may be laid back for stabilization, which would result in large bare areas until grass or lodgepole pine seedlings became established after 2-3 years. Cutting into slopes for road widening would be minimized. Soil may be added to disturbed surfaces to enhance revegetation. Forest would eventually reclaim slopes and encroach upon the roadway after 10-20 years. Roadside slopes would be contoured to blend into the adjacent natural vegetation. Wavy, feathered swath edges left from roadway clearing would reduce the slot effect of straight edge cuts through the forest. The overall long-term visual effect between Old Faithful and West Thumb would be a road with a wider paved top and shoulders, and somewhat increased lateral visibility and forward sight distance. The construction proposed for other segments would have little impact on the existing visual effect.

Cultural Resources

Proposed changes in alignment, increased width, and type of surfacing material would not effect National Register qualities of the roadway under this or any of the alternatives.

Replacement of the log guardrailing and removal of stone facing on many of the 24-inch culverts would be an irretrievable loss of resources contributing to the historic significance and physical integrity of the Grand Loop Road. In order to mitigate the loss of features eligible for nomination to, or listed on the National Register of Historic Places, the Historic American Building Survey would be consulted and the requisite documentation completed prior to the alteration, removal, or destruction of contributing resources. Weathering steel guardrailing would not have the same aesthetic or historic qualities of the existing log guardrailing, however would provide a compatible earth-tone appearance and meet current federal safety standards. Railing of steel-backed square timber, which currently meets federal crash safety standards, would provide a more natural appearing wooden surface, but of a milled square shape. The steel-backed, 3/4-log railing does not currently meet safety standards, although it may in the near future. This railing would provide a more natural appearance, both in surface and shape, approximating the existing log railing. Reinstallation of some of the stone facing on new culverts would help retain some of the contributing historic material, and thereby would help to maintain the character of the cultural landscape. The loss of other stone facing would destroy the historic continuity of this contributing design feature.

Turnouts proposed for rehabilitation would be designed and rebuilt to retain scale with the natural and historic setting. Use of native materials such as log, wood, and stone would maintain continuity and historic character. The addition of safety islands would be an addition of non-historic design features but would be constructed of comparable materials to blend with the historic landscape.

Socioeconomic Environment/Visitor Use

Long-term benefits to travelers would include improved driving comfort from a smoother ride on a new pavement surface, improved traffic safety by increased sight distance near turnouts, reduced hazard from concealed roadside wildlife (until forest grows back to the road edge in 10-20 years), and improved driving convenience and safety provided by the paved shoulders and wider traffic lanes. The wider road and improved turnouts would have an increased traffic capacity, resulting in less congestion and less traffic backed up behind slow vehicles and bicycles. Bicyclists would realize improved safety and pleasure by travel on the paved shoulder, out of the main traffic flow.

Traffic circulation and safety features would be improved by redesign of turnouts, thereby improving the visitor experience. Pedestrians at Scaup and Isa lakes would benefit from safer footing provided by hardened lakeshore walks, which would also provide pleasant walking paths. Traffic congestion and slowing would continue in the Isa Lake area, with a hazardous mixture of pedestrians, bicycles, and motor vehicle traffic continuing to use the bridge. Improved signing with a posted speed limit of 25 mph, and retention of steep grades on the approaches would tend to regulate traffic speed through the area.

Travelers through the construction areas would experience periods of inconvenience from delays, rough road, dust, fumes, and noise from construction activity. Truck traffic hauling material from the borrow sites to the project would be a significant inconvenience to visitor traffic. This would be mixed with the usual traffic between Flagg Ranch and West Thumb, and possibly through the town of West Yellowstone and Old Faithful area, causing noise dust, fumes, and congestion for park visitors and persons in West Yellowstone. Some damage to existing roads would result from heavy loads.

Maintenance of the new road would be slightly less expensive. The 1-foot-wide stabilized gravel shoulder may be difficult to maintain due to damage from plow blades during snow removal, although it would help stabilize the pavement edge and provide a visual transition to the roadside area.

The lane and shoulder width of this alternative departs from the 32-foot pavement width (12-foot lanes and 4-foot paved shoulders) suggested by NPS guidelines in Park Road Standards (NPS 1984) for the existing ADT and bus, RV, and bicycle traffic. The standards also suggest that the allowable justification for such departure would be either reduced impact to natural and cultural resources, or aesthetic reasons. The overall environmental impact and visual effect from a park road widening project is usually dominated by the amount of ground disturbance, vegetation clearing, and slope modification, rather than the actual pavement width. The choice of alternative A would be based on the improved appearance of the roadway resulting from a narrower pavement width and the more natural transition from pavement to roadside vegetation created by a stabilized gravel shoulder. The narrower lanes and paved shoulders will, however, increase the potential for vehicle/bicycle conflicts, particularly when wide vehicles such as buses and RVs meet in opposing lanes while passing a bicycle on the shoulder.

See Traffic Management Alternatives below.

ALTERNATIVE B: NO ACTION

Natural Environment

Continuation of existing use and management would have few if any new impacts on natural resources and would perpetuate management and use of the road corridor. Unstable steep cut slopes that have resisted revegetation would continue to remain barren. Individual large hazard trees would continue to be removed from the roadway slopes. Disturbance and roadkills of birds, rodents, deer, elk, and bear would continue. There would be no new effects on threatened or endangered species. Grizzly bears would continue to be disturbed by traffic, resulting in some displacement from the roadway. No new effects on water resources, floodplains, or wetlands would be expected. The culvert blocking spawning trout in upper Spring Creek would continue to be a barrier. Air quality would continue to be affected along existing trends by mobile emissions of motor vehicles.

Cultural Environment

Under this alternative there would be no negative impacts to existing cultural resources. The existing historic character and integrity of the road and related features would be preserved. Current management and maintenance practices of historic features would continue.

Socioeconomic Environment/Visitor Use

Visitor use and traffic patterns would most likely continue along current trends. Existing maintenance activities such as pothole patching would continue, requiring a disproportionate amount of time and money. Travelers using the Old Faithful/West Thumb road would continue to be inconvenienced by a pavement surface made extremely rough by repeated patching of numerous potholes, advanced pavement cracking, and large scale rough breaks from road base and pavement failures. Damage to motor vehicles and slow traffic caused by the rough pavement would continue. If current trends continue, the pavement surface would continue to deteriorate, possibly leading to traffic restrictions or road closures.

The narrow traffic lanes would continue to make driving wide vehicles difficult, requiring greater than normal driver concentration. If a vehicle leaves the pavement edge, the lack of shoulders makes recovery of control difficult, creating a hazardous condition. Bicyclists would continue to be exposed to danger from being hit by motor vehicles (or their side mirrors) or being forced off the road while riding in the traffic lane. This will eventually result in a very serious or fatal accident to a bicyclist. Bicyclists tend not to report close calls or being forced off the road, so the true incident rate is probably poorly documented.

Abrupt dropoffs along the roadside and at some informal dirt-surfaced turnouts would continue to make turning off the road dangerous and inconvenient, reducing driving pleasure and discouraging slow vehicles from pulling off and letting backed-up traffic pass.

Lack of parking and traffic congestion due to inefficient circulation at some turnouts and at the Lone Star Geyser trailhead would continue to inconvenience visitors. Use of signs and guardrailing that do not meet current highway safety standards would continue. The existing signs on non-breakaway posts create a safety hazard to vehicles. Potential failure of existing guardrailing would contribute to injuries received from a car leaving the roadway.

The pavement on the Old Faithful, West Thumb, and Lake area bypass, while reasonably wide, would continue to break up and deteriorate, causing a rough ride and leading to advanced road damage.

Business at concessions and local communities would not be affected in the short term, until road quality became intolerable.

Travelers would continue to be confused by the extra one-way traffic ramp at the West Thumb interchange, resulting in confusion and hazard when drivers head the wrong way, with potential for head-on collisions.

ALTERNATIVE C: REHABILITATE EXISTING ROAD

Natural Environment

Repairs of base failures would require localized excavation of the road base material, disturbing the surface and vegetation immediately adjacent to the pavement. Vegetation including grass and small trees that have revegetated the constructed foreslope would be cleared, removed, and old fill material would be replaced with crushed aggregate. Approximately 5 acres would be affected. Major cut and fill slopes would not be affected. Unstable barren cut slopes would continue to slump or drop rockfall into the roadway and would continue to resist revegetation.

Disturbance and roadkills of birds and mammals resulting from traffic would continue to follow existing patterns. The concealment of wildlife by the encroaching forest edge extending to the roadway would continue to contribute to wildlife/vehicle accidents. Paving operations may cause some minor and temporary displacement and disturbance to wildlife due to fumes, dust, and equipment noise, although this is not expected to be significantly more than existing disturbance by traffic.

Threatened and endangered species would not receive significant new impacts. The existing effects of disturbance and displacement from traffic along road corridors would be perpetuated, as in alternative B.

Water resources, floodplains, and wetlands would not be affected. The upper Spring Creek culvert 0.7 mile west of the Isa Lake bridge and the DeLacy, Dry, and Herron creek culverts would be modified to allow passage by spawning trout, as described in alternative A.

The borrow sites would be the same as in alternative A. Hydrocarbon emissions, noise, and dust would be of the same type as described in alternative A, but of less total quantity and duration because the overlay would not require as much material or occur over as long a duration as alternatives A or D.

Visual quality of the roadway would differ little from the existing scene because there would be minimal disturbance to soil and vegetation adjacent to the roadway. The existing forest encroachment to the road edge would remain, and the existing appearance of the roadway and surrounding slopes would be largely unchanged.

Cultural Resources

Replacement of the historic log guardrailings with weathering steel guardrailings would be a loss of a contributing resource and integral feature of the historic landscape as discussed in alternative A.

Socioeconomic Environment/Visitor Use

Travelers would benefit in the long term from the improved riding quality from the new pavement surface. The narrow roadway between Old Faithful and West Thumb would continue to inconvenience drivers because of the high degree of concentration necessary for driving. Visitor use and traffic patterns would continue along current trends, with short periods of inconvenience from delays, dust, fumes and noise from construction activity. Traffic would continue to be slowed by bicycles riding in the traffic lanes, and by lack of turnouts for slow vehicles to pull over. Congestion and lack of parking would continue at some turnouts.

Traffic hazards would continue due to features of the narrow roadway, such as lack of recovery area on the narrow shoulders contributing to roll-over accidents, poor sight distance at some turnouts contributing to collisions, concealment of wildlife in roadside vegetation resulting in roadkills, and a mixture of wide vehicles and bicycles in the traffic lanes. Replacement of rigid signposts by breakaway posts would reduce potential hazard, as would replacement of log guardrailing by stronger steel-backed timber guardrailing. Hazards from abrupt drop-offs at informal dirt turnouts would be eliminated by either upgrading and paving the turnouts, or eliminating the turnouts.

Visitors would benefit from improved safety by removal of the extra traffic ramp at the West Thumb interchange, as in alternative A.

Business at park concessions or in communities outside the park would be unaffected by overlay operations.

ALTERNATIVE D: REHABILITATE AND WIDEN ROAD TO 32-FOOT WIDTH

Natural Environment

Localized base repair and paving between Biscuit Basin and the upper Firehole River bridge would result in minor disturbance to soil and vegetation along the road shoulder.

Between the upper Firehole River bridge and the West Thumb interchange, the road base would require significant widening, with impact to soil and vegetation similar to those described in alternative A. The construction limits (limit of disturbed area) would be increased by two feet horizontally from those in alternative A. Cut and fill slopes would be the same angle as in alternative A, although they would be moved horizontally 2 feet to accommodate the wider road. Approximately 94 acres (5.5 acres per mile) of soil and vegetation would be disturbed by road widening, of which approximately 68 acres, or 72 per cent was previously disturbed by construction in the 1930s.

Disturbance to soil and vegetation from modifications of Kepler Cascades turnout, Lone Star Geyser trailhead, Scaup Lake turnout, and Isa Lake turnout would be the same as described for alternative A.

The West Thumb bypass would require no widening of the existing base width, with little or no effects on soil and vegetation.

Localized base repair and overlay of the Lake area bypass would result in minor disturbance to soil and vegetation along the road shoulder.

Revegetation efforts and impacts would be same as in alternative A.

Short and long term effects to wildlife would be the same as alternative A.

Effects to threatened and endangered species would be the same as alternative A.

Effects to streams, spawning habitat, and floodplains would be the same as alternative A. Encroachment on roadside wetlands would be slightly greater than alternative A because of the greater width of fill placed to expand the road base. Approximately 0.30 acre of wetland would be filled, as compared to 0.25 acre in alternative A.

Effects on air quality would be the same as described for alternative A. The visual quality of the roadway would differ from alternative A by the slightly different appearance of the wider traffic lanes and shoulders and by the slightly increased surface of cut/fill slopes. The latter effect would reduce as the slopes became revegetated over a 2-3 year period. As with alternative A, the roadway vista would be temporarily opened up compared to the existing condition, then would be reforested by lodgepole pine in 10-20 years. Forest clearing would be done to provide a wavy, "feathered" edge as in alternative A.

Truck traffic would have similar effects to visitors and park roads as described in alternative A.

Cultural Environment

Impacts to log guardrailings, stone-faced culvert headwalls, and turnouts would be similar to those discussed in alternative A.

Socioeconomic Environment/Visitor Use

Long-term benefits would be similar to alternative A, with added convenience to drivers of wide vehicles afforded by the wider 12-foot lanes and 4-foot paved shoulders. The 12-foot lane meets suggested standards for park roads with recreational vehicles and tour bus traffic (NPS 1984). Other improved safety features would be the increased recovery area proved by the wider road top and improved sight distance and sign safety as in alternative A. Bicyclists would benefit from improved safety and ride quality provided by the wider 4-foot paved shoulder. Travelers would experience the same short term inconveniences during the 3-4 years of construction as described in alternative A.

Maintenance of the road would be less expensive than the existing condition, and the paved shoulders would be easier to maintain and plow than the stabilized turf shoulders of alternative A. The 32-foot width would provide an adequate top to maintain a 28-foot minimum pavement width in future years without road base widening when the next pavement overlay is applied.

TRAFFIC MANAGEMENT ALTERNATIVES (FOR REHABILITATION ALTERNATIVES A AND D)

Traffic Management Alternative A

If traffic management alternative A were adopted, construction would proceed during daylight hours without the requirements of providing a driveable surface for the public during or after construction shifts. This would greatly simplify lengthy construction operations such as replacement of culverts, excavation and replacement of poor road base sections, widening of the road base, excavation and grading of cut and fill slopes, and paving. In these and other aspects of construction, maintenance of a passable surface for public access would require a large amount of work that would be unnecessary if the roadway were closed. Flagging and traffic control would also be unnecessary. Quality control would be improved by not having to maintain public access, and work efficiency and safety would be increased. Construction costs and the construction period would be reduced to the minimum, resulting in savings of $2,400,000 to $4,500,000 of federal funds compared to traffic management alternatives B and C.

Under this option, the road between Old Faithful and West Thumb would be closed to visitor traffic around the clock, and normal travel patterns within the park would be disrupted for two seasons. Instead of driving directly between Old Faithful and West Thumb, visitors wishing to stop at Old Faithful would be directed to detour an additional 62 miles (one way) via Norris and Canyon junctions, increasing driving time approximately 1 1/2 hours. This increase in driving time may be somewhat more than the time that would be spent in construction delays (slowed traffic on a rough roadway, waiting for pilot cars, etc) if traffic were maintained through the construction project, as in traffic management alternatives B and C. Visitors would also be spared the inconvenience of dust and of driving on a rough surface.

Heavier-than-normal traffic would impact travel on the detour route, particularly between Madison Junction and Old Faithful. All visitor traffic to Old Faithful would be required to "back-track" to Madison Junction, necessitating a 32-mile roundtrip from the junction. Some "drive-through" visitors on tight schedules may forego visiting the Old Faithful area. Persons making a round-trip from Jackson to Old Faithful would drive an additional 124 miles.

Overall concession business levels within the park are expected to be minimally affected by road closure, with business probably shifting from Old Faithful to other areas, especially those along the detour route. Bus tours would need to be rerouted and possibly rescheduled to avoid peak periods of traffic congestion on the detour. The effect on travel-related business outside the park at the gateway communities is difficult to forecast with any certainty. Local business persons feel road closure would reduce business. Due to the great attractions of Yellowstone and Old Faithful, however, business may be more affected by other factors such as the national economy and gasoline prices. Construction and any of the traffic management options would disrupt normal travel patterns within the park, but these disruptions would last only two seasons under alternative A, the shortest construction period of the options considered.

Construction workers would contribute to the local economy in all alternatives, but for the shortest period of time under alternative A.

Traffic Management Alternative B (NPS Preferred)

If traffic management alternative B were adopted, construction would proceed at night with the road closed to visitor traffic between approximately 9 p.m. and 9 a.m. (actual hours are subject to change). At the end of each work shift, a driveable surface would be restored to accommodate two-way daytime visitor traffic. This would require a significant amount of work on a recurring nightly basis, complicating construction operations. Flagging and traffic control would occasionally be necessary to ensure safe visitor travel through the construction area. Quality control would probably be reduced by working at night and by the increased potential for contamination of road base material when restoring the driving surface for daytime use. Work efficiency and safety would be reduced by working at night. The construction period would be extended by an additional season to three years, and costs would be increased by $2,400,000 when compared to alternative A.

Under this option, visitor traffic would be maintained during the daytime hours from approximately 9:00 a.m. to 9:00 p.m. (times may change) between Old Faithful and West Thumb, but normal travel patterns in the park would be disrupted for three seasons. Travel time through the seventeen miles of construction between Old Faithful and West Thumb would be increased, on occasion equaling the travel time for taking the detour. Visitor experience would be degraded by the usual inconveniences of travel through a construction area: dust, driving on a rough surface, and potential vehicle damage resulting from flying rock chips, etc. Traffic would probably increase on the detour route via Norris, Canyon, and Madison junctions, due to visitors choosing to avoid the delays and inconveniences of the construction area. Some "drive-through" visitors on tight schedules may forego visiting the Old Faithful area due to peak-period traffic congestion in the construction area and on the detour route.

Overall concession business levels within the park are expected to be minimally affected by this traffic management option, but business will probably shift from Old Faithful to other areas, especially those along the detour route. Bus tours would need to be rescheduled to allow for slower traffic time through the construction area, and some tour operators may reroute their tours to avoid the construction. Travel-related business levels outside the park at the gateway communities would be expected to be minimally affected by this alternative. Disruption to normal travel patterns within the park would last for three seasons, or one additional season compared to alternative A.

Traffic Management Alternative C

If traffic management alternative C were adopted, construction would occur at night from approximately 9:00 p.m. to 9:00 a.m., with nighttime one-way visitor traffic passing through the construction area following pilot cars. At the end of each night shift, a driveable surface would be restored to accommodate two-way daytime visitor traffic from approximately 9:00 a.m. to 9:00 p.m. This option would require extensive work to maintain a one-lane driving surface at night and to restore a two-way surface at the end of each night shift, reducing construction efficiency to the lowest of the alternatives considered. Flagging, pilot cars, and other traffic control measures would be necessary to ensure safe nighttime visitor travel. Quality control would be reduced by working at night and by a high potential for contamination of road base material when maintaining driving surfaces for use. The construction period would be extended to four seasons, two seasons longer than alternative A; construction costs would be increased by $4,500,000 when compared to alternative A.

Under this option, visitor traffic would be maintained at all hours, but normal travel patterns would be disrupted due to the same type of delays, visitor inconveniences, and traffic congestion as described for alternative B. Shifts in travel patterns and the resulting changes for concession business in the park and travel-related business at the gateway communities outside the park would also be similar to those described for alternative B, but would last for four seasons, or two additional seasons when compared to alternative A.

CONSULTATION/COORDINATION

The following agencies and persons were consulted in preparation of this environmental assessment:

Staff, Federal Highway Administration
Staff, Fish and Wildlife Service
Staff, National Park Service, Denver Service Center
Staff, National Park Service, Rocky Mountain Regional Office
Staff, National Park Service, Yellowstone National Park

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